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**NAVAL WAR COLLEGE
Newport, RI**

**U.S. JOINT THEATER BALLISTIC MISSILE DEFENSE:
SEEKING OPTIMAL COMMAND AND CONTROL**

By

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A paper submitted to the faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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17 May 2005

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Abstract

The United States has undertaken an ambitious program for developing a global ballistic missile defense capability to defend America, its armed forces and its allies. The vision for this capability presents an interesting question on command organization since the conventional military structure is based on warfighting in distinct geographic areas of responsibility. This paper will address the question ‘what is the optimal command and control concept for U.S. joint theater ballistic missile defense forces?’ A discussion of missile defense systems, concept of operations and joint doctrine that currently exists will be considered in relation to several command and control options for organizing theater ballistic missile defense forces.

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INTRODUCTION

In the aftermath of terrorist attacks on the World Trade Center and the Pentagon on September 11, 2001, the United States felt cause to reevaluate the strategies that it relies upon to defend American citizens, its military forces and its allies abroad. This tragic event increased the awareness of new and emerging threats to America that have been made possible by the proliferation of ballistic missile technology and Weapons of Mass Destruction (WMD) to state and non-state actors around the globe. The risk to America has increased due to the potential damage caused by WMD, the difficulty of destroying ballistic missiles once they have been fired, and an increase in the number of groups that have hostile intentions toward the United States and could use such weapons against America. As recently as December 17, 2002, President George W. Bush focused national objectives toward achieving substantially improved capabilities for providing missile defense. “The deployment of missile defenses is an essential element of our broader efforts to transform our defense and deterrence policies and capabilities to meet the new threats we face. Defending the American people against these new threats is my highest priority as Commander-in-Chief, and the highest priority of my Administration.”¹

As the United States continues to expand its ballistic missile defense capabilities beyond its own territory, it will be important to have an effective command structure for executing this mission in any theater of operations. This paper will address the research question, ‘What should be the optimal command and control concept for U.S. joint theater ballistic missile defense forces?’ While ballistic missile defense could be performed as a

¹ The White House, “President Announces Progress in Missile Defense Capabilities.” <http://www.whitehouse.gov/news/releases/2002/12/20021217.html>. Accessed: 18 Mar 2005.

force protection function independently by each service present in a given theater, it will be assumed that this role has now been firmly established as a joint responsibility.

To answer the research question it will first be necessary to describe the operational concept for ballistic missile defense that has been articulated by the Missile Defense Agency (formerly the Ballistic Missile Defense Organization). The various weapons, sensors and interfaces that will comprise the Ballistic Missile Defense System will be considered in terms of expected capabilities and functions within the overall system. Second, current U.S. joint military doctrine concerning the areas of command and control and ballistic missile defense will be explained. A purpose for this section will be to explore how current guidance will translate into a notional command and control concept when applied to ballistic missile defense forces deployed to a given theater. Finally, several alternative command and control concepts will be considered with the aim of evaluating the advantages and disadvantages of each. This section will evaluate the implications that joint doctrine, systems and the concept of operations have on the various command and control options for TBMD.

Due to a length limitation for this research paper it will be necessary not to address several important areas related to ballistic missile defense. Since this paper will be focused specifically on theater missile defense, it will not separately consider the command and control concept for national missile defense. Much of this distinction has been blurred by the fact that the Missile Defense Agency is developing the Ballistic Missile Defense System with a global framework in mind rather than as two distinct systems. This paper will not address the viability of the various acquisition programs being developed or procured or evaluate which are likely to be more effective. It assumes that systems and capabilities will be available in the general timeframe anticipated by official government agencies. Finally, this

paper will not consider the national cost of building ballistic missile defenses or argue its importance relative to other national priorities during a time of intense competition for limited resources. All of these concerns would be suitable for further study and evaluation.

BALLISTIC MISSILE DEFENSE SYSTEM

Based on executive direction from the President, the United States has embarked on an ambitious goal of developing a global missile defense capability. The initial concept of operations for fielding and operating such a force, though not formally given the designation, has been sketched out by the Missile Defense Agency. "In response to this national security challenge, the Missile Defense Agency (MDA) is developing an integrated, layered Ballistic Missile Defense System (BMDS). Over time, the BMDS will become capable of handling all three phases of a hostile ballistic missile's flight, as well as defending against all ranges of ballistic missiles--short, medium, intermediate, and long."² The specific terms in this statement are important to understanding the overall concept being conceived. The term 'integrated' means that each of the component sensors and weapons will operate transparently with each other so that an automatic flow of information is achieved. This is a naturally desirable efficiency for any weapon system, but is especially important for a defensive system that must support rapid engagement timelines and decision processes. It is in contrast to legacy systems which do not function with a common architecture across services or even within individual services. It also implies a joint aspect to the program since army, navy and air force acquired assets will all be incorporated into the system. The term 'layered' means that multiple missile intercept opportunities will be available to provide the highest chance of successfully defeating an inbound missile. Further expanding the concept

² Missile Defense Agency Briefing, "Ballistic Missile Defense System: The Beginning."
<http://www.acq.osd.mil/mda/mdalink/pdf/bmdsbook.pdf>. Accessed: 18 Mar 2005, 4.

of layered defense is the intention to target ballistic missiles in the boost, mid-course and terminal phases of flight.

The sensors that operate within the BMDS include several land-based early warning radars for tracking missile flight paths, Defense Support Program (DSP) satellites that can detect heat plumes caused by missile launches and sea-based radars onboard Aegis class cruisers and destroyers.³ Also being developed is the sea-based X-band radar (SBX), which will further improve the theater radar coverage.⁴ The current capability to intercept missiles in the terminal phase consists of deployable PAC-3 missiles.⁵ For mid-course intercept the army has missile facilities for the Ground-based Midcourse Defense (GMD) in Alaska and California and the navy has the Standard Missile 3 (SM-3), which is carried onboard back fitted Aegis class cruisers and destroyers.⁶ Plans are being discussed to build a third GMD missile facility in a third location, outside the United States.⁷ To further improve the capability to intercept missiles in the terminal phase, the Terminal High Altitude Area Defense (THAAD) missile system is being developed.⁸ While there are currently no weapon systems capable of intercepting ballistic missiles during the boost phase, the air force is developing the Airborne Laser (ABL) which could eventually provide this capability.

³ Missile Defense Agency Briefing, "Ballistic Missile Defense System: The Beginning." <http://www.acq.osd.mil/mda/mdalink/pdf/bmdsbook.pdf>. Accessed: 18 Mar 2005, 11.

⁴ Ibid., 12.

⁵ Congress, Senate, Armed Services Committee, Fiscal Year 2005 Missile Defense Program and Budget, 108th Cong., 2nd sess., 11 March 2004, 19.

⁶ Ibid.

⁷ Ibid., 13.

⁸ Trey Obering, "Speech at Multinational BMD Conference." <http://www.acq.osd.mil/mda/mdalink/pdf/oberng04.pdf>. Accessed 18 Mar 2005, 3.

The MDA is developing a common architecture for tying these weapons and sensors together and has termed it Command, Control, Battle Management, and Communications (C2/BM/C). “It allows the President, Secretary of Defense, and Combatant Commanders at strategic and tactical levels to systematically plan the fight (Planner), commonly see it unfold (Situation Awareness), dynamically direct/adjust (Battle Management) networked sensors and weapons systems (Network) to optimally engage (one shot – one kill) ballistic missile threats at any range, in any phase of flight, at any time.”⁹ While each of the sensors and weapons described above provide an individual contribution to performing the ballistic missile defense mission, the success of the BMDS will hinge largely on the extent to which they are linked together by a common operating architecture.

To further explain the operational concept for ballistic missile defense, the MDA has developed a notional engagement sequence, assuming the integration of weapons and sensors within the C2/BM/C architecture. First, a ballistic missile launch is detected by the DSP satellites. The launch alert is provided to several Department of Defense locations, including the combatant commands. Forward deployed Aegis warships search for and track the ballistic missile, passing the information back to the network. A ground-based interceptor (GBI) is launched. Land-based radars continue to track the missile, assisting the interceptor in achieving a “hit to kill” impact with the ballistic missile.¹⁰ While this notional engagement sequence is helpful in understanding the overall concept, it still leaves room for clarification. It specifically considers defending the continental United States against a ballistic missile attack from an overseas location. It incorporates a wide array of BMDS

⁹ Missile Defense Agency Fact Sheet, “Command, Control, Battle Management, and Communications.” <http://acq.osd.mil/mda/mdalink/pdf/c2bmc.pdf>. Accessed: 18 Mar 2005, 1.

¹⁰ Missile Defense Agency Briefing, “Ballistic Missile Defense System: The Beginning.” <http://www.acq.osd.mil/mda/mdalink/pdf/bmdsbook.pdf>. Accessed: 18 Mar 2005, 7.

components in a joint command relationship, including assets like the Aegis warship which are operating in a separate geographic theater from the intended target. However, the notional engagement sequence does not specifically explain the command and control relationship between forces involved. It does not explain whether the Combatant Commander in the geographic location of the target (in this case CONUS) has any control over weapons that could be launched to intercept the ballistic missile from another geographic theater. Equally important and unexplained, and the focus of this paper, is the command and control concept for conducting theater ballistic missile defense using the BMDS. This concern will be addressed further in the sections on command and control alternatives.

JOINT MILITARY DOCTRINE

In order to support a discussion on alternative command and control concepts for joint theater ballistic missile defense in the next section, it is important to establish what current joint military doctrine directs. The two separate areas that will be considered are doctrine on command and control and doctrine specifically related to the function of air and missile defense forces.

Overall organizational guidance is provided to joint force commanders (JFCs) in joint publication 3-0. “**The first principle in joint force organization** is that JFCs organize forces to accomplish the mission based on the JFCs’ vision and concept of operations. Unity of effort, centralized planning and direction, and decentralized execution are key considerations.”¹¹ While this statement is easily understood and often quoted, it is significant because it provides considerable flexibility to the commander to tailor his command structure

¹¹ Chairman, Joint Chiefs of Staff, Doctrine for Joint Operations, JP 3-0. Washington, DC: DoD Printing, 10 Sep 2001, x.

appropriate to the situation as he sees it. Some options available to unified commanders include establishing subordinate unified commands, functional component commands, and joint task forces (JTFs). Subordinate unified commands must be approved by CJCS for conducting operations on a continuing basis on either a geographic or functional basis, such as for all U.S. forces in Korea. Functional component commands can be appropriate when multiple services provide similar capability in a functional area and operate in the same medium. Current joint doctrine establishes this structure as the normal method for the air defense mission. JTFs provide a flexible option for conducting missions on a geographic or functional basis when seeking to accomplish operational-level objectives.

Joint doctrine for theater ballistic missile defense is largely composed of two documents: Joint Doctrine for Countering Air and Missile Threats (JP 3-01) and Doctrine for Joint Theater Missile Defense (JP 3-01.5). While the documents contain a level of detail beyond the scope of this paper, they mirror each other closely in the explanation of mission areas and command relationships. The guidance indicates that the counterair mission consists of offensive and defensive counterair operations against enemy aircraft, ballistic missiles and cruise missiles. This arrangement considers that all of these threats and the weapons to defeat such threats essentially operate in the same medium. Destroying theater ballistic missiles that have already been launched is a subset of the defensive counterair (DCA) mission.

With respect to theater ballistic missile defense, joint doctrine provides guidance to the JFC for establishing two command functions within the counterair mission. First, it indicates that “the JFC **normally designates the joint force air component commander (JFACC)** as the supported commander for theater- and/or joint operations area (JOA)-wide

counterair.”¹² Second, it establishes the role of the area air defense commander (AADC) for coordinating and executing the air defense mission. While doctrine indicates that these two assignments are frequently made to the same individual commander, it is not mandatory. Since each commander is normally selected based on the service component that has the preponderance of air assets and air defense assets, respectively, it is very feasible that it could be commanders from two different services. The guidance further advises that if both assignments are not made to a single commander then close coordination will be essential to effective operations.¹³

STRATEGIC COMMAND AND CONTROL OPTION

One command and control option for conducting joint theater ballistic missile defense (BMD) is to align all (or specified) fielded forces with BMD capability under a single unified commander, probably the U. S. Strategic Command. While this option is hardly considered in the number of articles written on ballistic missile defense, it is worth considering because it represents a possible optimization of the command organization.

The Unified Command Plan provides the foundation for establishing combatant commander responsibilities based on either geographic or functional areas. “A **functional** type of command organization is usually established when it is required to have centralized control and direction of certain military functions or types of operations that are not restricted to or limited by a specific geographic area.”¹⁴ As envisioned in the President’s announcement and in the concept of operations established by the Missile Defense Agency, it is conceivable that ballistic missile defense could be conducted as a separate functional area

¹² Chairman, Joint Chiefs of Staff, Joint Doctrine for Countering Air and Missile Threats. JP 3-01. Washington, DC: DoD Printing, 19 Oct 1999, vii.

¹³ Ibid., II-4.

¹⁴ Chet Helms, “Operational Functions,” Course material for Joint Military Operations Department, Naval War College, Newport, RI, Spring 2005, NWC 4103A, 6.

on a global scale. Theater ballistic missile defense could be managed as a subset mission by the single combatant commander.

Another aspect that must be addressed in evaluating the C2 structure is whether theater ballistic missile defense is a strategic objective or an operational objective. For comparison, one should consider the C2 structure for strategic forces. The Unified Command Plan states that “USSTRATCOM will have primary responsibility for strategic nuclear forces to support the national objective of strategic deterrence.”¹⁵ Offensive strategic forces are aligned to perform a strategic role with unity of command to a single combatant commander even while those forces operate in other combatant commanders’ geographic areas of responsibility. If strategic deterrence is a national strategic objective, then it is reasonable that ballistic missile defense may be also. If strategic deterrence fails, then ballistic missile defense is a backup to ensure WMD are not effectively targeted against Americans. This is not inconsistent with the President’s statement quoted in the introduction. If this is true, then defensive ballistic missile defense forces may best be organized under a single combatant commander.

There are several reasons why a strategic organization of ballistic missile defense forces could prove optimal. First, a streamlined chain of command would allow high-level decision makers the best control over limited warfighting resources. Decisions on how to engage incoming ballistic missiles would need to be made quickly since the reaction time against missiles is short. For example, in the notional engagement sequence, the forward deployed Aegis warship could have been tasked to take the first shot at the ballistic missile targeted at the United States. While preplanned responses would be important to rehearse

¹⁵ Department of Defense, “Unclassified extract of Unified Command Plan,” Washington, DC: DoD Printing, 30 Apr 2002, 17.

and execution authority could be delegated down the chain of command, the commander would need to be responsive to unexpected situations. By maintaining unity of command, it would be easier for the commander to control engagements by individual shooters than it would be if he had to rely on cooperation with another commander. With numerous potential shooters in different geographic AORs capable of engaging a ballistic missile, a single commander could be in the best position to ensure that only the optimal shooter engages. This structure could also be crucial to keeping national leaders informed at the strategic level where offensive actions may hinge on the outcome of the defensive battle. Finally, national leaders might be willing to tolerate more operational risk in some geographic areas to maximize strategic readiness in others. Unity of command would facilitate decisions at that level such as where to deploy forces.

While providing some potential benefits, there are several reasons why strategic organization under a single combatant commander would not be optimal for conducting theater ballistic missile defense. First, this concept goes against the operational paradigm with which combatant commanders are familiar and is not supported well by operational doctrine. Combatant commanders would probably resent losing control over part of the forces that provide operational protection to their forces. Because many BMD forces such as warships and missile batteries are multi-purpose capable, combatant commanders would likely exert pressure for increased force structure to fulfill other missions. Perhaps the biggest obstacle to this kind of organization would be the challenge of integrating forces at the operational and tactical levels through cooperation rather than unity of command. Many of the operational methods for preventing fratricide would be heavily stressed, inherently increasing the risk to friendly forces.

OPERATIONAL COMMAND AND CONTROL OPTIONS

Conventional military wisdom has maintained that theater ballistic missile defense is an operational warfighting function under the control of the combatant commander. This can be easily construed through the Unified Command Plan, which assigns responsibility for force protection to each combatant commander, and in joint doctrine duties for JFACC and AADC, as discussed earlier. However, even under this paradigm there is substantial debate over the optimal C2 organization for theater ballistic missile defense. Most options that have been considered implicitly recognize that the AADC is overburdened with the multitasking of conducting DCA against enemy aircraft, cruise missiles and ballistic missiles.¹⁶

One option that has been used in a real world operational exercise was to assign a Deputy Area Air Defense Commander (DAADC), who was responsible to the AADC for conducting theater land-based air and missile defense.¹⁷ The DAADC was an army officer experienced in air defense. This allowed the AADC, an air force officer who was also assigned as the JFACC, to concentrate on offensive air and offensive counterair operations. This kind of arrangement took advantage of the unique backgrounds that the two officers had within their respective specialty areas while still allowing close coordination of assets working in the air medium. While joint doctrine does not explicitly identify a breakdown in responsibility below the AADC level, this option is consistent with executing OCA and DCA missions with a linear chain of command under the JFACC.¹⁸ Another factor which adds credibility to this command organization is the makeup of land-based TBMD and air defense

¹⁶ Pedro R. Oms, "Area Ballistic Missile Defense Coordinator and the Airborne Laser: Creating Ballistic Missile Defense Unity of Effort" paper written at the Naval War College, Newport, RI, 16 May 2003, Dialog, DTIC, ADA 420307.

¹⁷ Daniel P. Sauter, "Just Another Headquarters or the Missing Link to the Theater Air Defense?" paper written at the Army Command and General Staff College, Fort Leavenworth, KS, 27 May 1999, Dialog, DTIC, ADA 370346.

¹⁸ Chairman, Joint Chiefs of Staff, Joint Doctrine for Countering Air and Missile Threats. JP 3-01. Washington, DC: DoD Printing, 19 Oct 1999, II-6.

assets. In a geographic theater other than CONUS, the army PAC-3 missile is the only current land-based dual purpose missile for conducting either TBMD or air defense against air-breathing threats. A problem with this C2 structure is that it fails to integrate all air and missile defense assets under the DAADC, since navy SM-3 missiles are not under his control.

Another C2 option would be to create a Deputy AADC in charge of TBMD only.¹⁹ The AADC would maintain responsibility for DCA against all air-breathing threats, and the JFACC would conduct OCA against air-breathing and ballistic missile threats. There would still be a need for very close coordination between the DAADC and the AADC because of mutual use of the air medium. Arguments for this structure are based on the very different nature of planning and executing the TBMD mission, as opposed to the DCA mission against air-breathing threats of cruise missiles and aircraft. Since ballistic missiles have unique flight profiles they can be distinctly recognized and deconflicted from air-breathing threats, reducing the risk of fratricidal engagements. This C2 organization would provide better unity of effort for TBMD than the first option, assuming that all BMD capable forces were under the control of the DAADC. A seam in this C2 structure, which would be difficult to manage, is that PAC-3 and SM-3 missiles provide the only current TBMD capability, while they are also important air defense weapons against air-breathing threats. A decision for separate allocation of forces or cooperative agreements between the AADC and DAADC would be necessary to ensure effective employment of these weapon systems. In other words, to optimize unity of effort for conducting TBMD, some sacrifice would need to be made in defending against the air-breathing threat. This difficulty may become less

¹⁹ Edward B. Schmidt, "Theater Ballistic Missile Defense: Who's Fight is it?" paper written at the Army War College, Carlisle Barracks, PA, 7 Apr 1999, Dialog, DTIC, ADA 363829.

significant as future TBMD weapons such as THAAD and ABL become available since they are being designed specifically for the TBMD mission.

A third option would be to create a new functional component commander called the Joint Force Ballistic Missile Defense Commander (JFBMDC). This commander would be at the same level as the JFACC and have authority over assigned BMD forces. An argument for this option would be that TBMD should not be considered a subset of counterair operations. This follows much the same reasoning as the second option. It challenges the air force claim to defending against any threat that uses the air medium, since the air force is not likely to have a preponderance of weapons to defend against ballistic missiles in the foreseeable future. It may also be appropriate when considering that TBMD is now, and will be more in the future, different than the other parts of the counterair mission. By creating a separate functional command area, the military would be able to build a cadre of BMD experts which are needed to adequately address the growing TBMD threat. This option would allow perhaps the best unity of effort in conducting the TBMD mission of the three options, but increases the coordination problem of operating multiple functional forces in the same medium under different commanders.

RECOMMENDATIONS

One thing that has been illustrated in this paper is that there is a gap between the vision or concept of operations for conducting ballistic missile defense on a global scale and the joint doctrine which ascribes the command and control organization for TBMD at a JFC level. The relatively recent vision expressed by the President and further developed by the MDA is very ambitious in scope without providing sufficient level of fidelity for structuring BMD forces and functions at the theater warfighter level. Further confusing the issue is the

relatively older joint doctrine, which was written to support TBMD using legacy systems and well established command organizations. This doctrine was written before a commitment to an integrated global BMD concept had been made.

To achieve the highest level of operational effectiveness it is crucial to establish unity of command. The Unified Command Plan achieves unity of command across all warfare areas within designated geographic areas of the globe. Unity of effort can be sought across these geographic boundaries with lesser effectiveness through cooperation. If TBMD is conducted under the present construct, then each combatant commander would only be responsible for intercepting missiles that will impact in his respective AOR. This construct may not adequately provide unity of effort, however, when considering ballistic missiles that cross AOR boundaries. It is not clear from the primitive concept of operations whether multiple shooters in different AORs will be commanded under a single chain of command. This is the foremost question that must be answered before more specific issues on command structure can be addressed. As the lead agency, the MDA should work to further define the concept of operations. This paper explored the option for a strategic arrangement of BMD forces commanded in any theater by USSTRATCOM. A decision to follow this path breaks with conventional warfighting paradigms and would need to be decided at the combatant commander level and national strategic level. It would also warrant a change to the UCP.

One way to clarify the concept of operations is to develop detailed notional engagement sequences based on threat and force structure estimates. This would be an ongoing process as the threat weapons continue to improve and proliferation spreads them to more locations. Computer engagement modeling would help predict the success of engagements. If the trend of technology requires more interceptor shots to achieve each kill

and as the available reaction time shortens, there should be a stronger argument for strategic unity of command. This would also be true if the ratio of threat missiles to interceptor weapons increases, since conservation of resources could become a limiting factor.

Refining the concept of operations should precede any work on joint doctrine. As discussed earlier, the JFC has flexibility to arrange his forces based on his vision and concept of operations. However, joint doctrine should also be updated to reflect the best method for conducting TBMD at the operational level so that standardization can be achieved. Real world examples indicate that there may not be enough structure in the TBMD guidance and that it is inadequate to the immense task of conducting TBMD. Specifically, the role of the AADC is inevitably becoming more complex, and the processes and systems for conducting DCA against air breathing threats versus ballistic missile threats are diverging. Several examples have been suggested which better define possible delegation of duties for a specific TBMD expert in the operational command organization.

Conducting TBMD in the future will rely on fusing multiple sensors and weapons into the common C2/BM/C architecture. As this technology is developed, it will provide valuable opportunities to test the command and control organization. Exercises that incrementally build in complexity need to be planned and conducted. These exercises should illustrate the ability to make decisions on weapon employment at the JFC staff level and go beyond testing the technology of missile intercept. The lessons learned from command and control exercises will be crucial to evaluating and improving the organizational structure.

CONCLUSION

The United States has set high expectations for developing a global ballistic missile defense system capable of defending its citizens, armed forces and allies. While much of the

work for this undertaking involves solving the unprecedented technological challenges of intercepting high speed weapons at high altitudes or in space, it has also challenged some of the military's fundamental assumptions about how to organize its fighting forces. At the theater level, the combatant commanders are pressed to conduct TBMD for protection of their forces using legacy equipment systems while also anticipating the development of future capability. A commitment needs to be made at high levels that will support further refinement of the operational concept of operations and joint doctrine in the area of TBMD. Current joint doctrine drives an almost ad hoc command and control structure under the area of counterair operations. Several options have been presented that offer more structure for standardizing organization from one joint force to another, and with formal billet definition these options should support developing a core of TBMD experts.

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